

Amendments to the Claims:

1. (Currently Amended) A system for updating objects over a network between a local device and a remote device, the system comprising:

a remote device that is arranged to facilitate updating objects over the network, wherein the remote device comprises:

a first network connection device that is arranged to facilitate communications over the network;

a first data store that is arranged for storing a first object; and

a first processor that is coupled to the first data store and the first network connection device, wherein the first processor is configured for:

a means for computing a first fingerprint function at every byte offset of a first object on the remote device;

a means for chunking the first object on the remote device based on the first fingerprint function;

a means for computing a remote signature for each chunk associated with the first object on the remote device;

a means for generating a remote signature and chunk length list on the remote device, wherein the remote signature and chunk length list is associated with the first object;

transmitting the remote signature and chunk length list with the remote device to the network;

receiving with the remote device a request from the network for transmitting at least one updated object chunk; and

transmitting the at least one updated object chunk over the network; and

a local device in operative communication with the remote device to facilitate updating objects over the network, wherein the local device comprises:

a second network connection device that is arranged to facilitate communications over the network;

a second data store that is arranged for storing a second object; and
a second processor that is coupled to the second data store and the second network
connection device, wherein the second processor is configured for:

- ~~a means for~~ computing a second fingerprint function at every byte offset of ~~[[a]]~~ the second object on the local device, where the first and second objects are associated with one another, and where the first fingerprint function is matched to the second fingerprint function;

- ~~a means for~~ chunking the second object on the local device based on the second fingerprint function, wherein ~~the means for~~ chunking the first object on the remote device is matched to ~~the means for~~ chunking the second object on the local device;

- ~~a means for~~ computing a local signature for each chunk associated with the second object on the local device, wherein ~~the means for~~ computing the local signature is matched to ~~the means for~~ computing the remote signature;

- ~~a means for~~ generating a local signature and chunk length list on the local device, wherein the local signature and chunk length list is associated with the second object;

- ~~a means for~~ negotiating a chunked transmission of the remote signature and chunk length list from the remote device to the local device over the network such that bandwidth use is minimized for the transfer of the remote signature and chunk length list to the local device;

- ~~a means for~~ identifying differences between the first object and the second object by comparing the local signature and chunk length list to the remote signature and chunk length list on the local device;

- ~~a means for~~ requesting transmission of at least one updated object chunk from the remote device when differences between the first object and the second object are identified by the local device;

- ~~a means for transmitting~~ receiving the at least one updated object chunk from the remote device ~~to the local device over the network;~~ and

~~a means for reassembling~~ assembling a copy of the first object on the local device with the at least one updated object chunk.

2. (Currently Amended) The system of claim 1, wherein the second processor is further comprising a means configured for requesting an update for the first object from the remote device.

3. (Currently Amended) The system of claim 1, wherein the first processor is further comprising a means configured for requesting an update for the first object from the local device.

4. (Currently Amended) The system of claim 1, ~~wherein negotiating the chunked transmission of~~ transmitting the remote signature and chunk length list comprises sending at least a portion of the remote signature and chunk length list from the remote device to the local device.

5. (Original) The system of claim 1, wherein one of the local device and the remote device is a client, and the other of the local device and the remote device is a server.

6. (Currently Amended) The system of claim 1, wherein the network is at least one member of group comprising: a direct wired connection, a parallel port, a serial port, a USB (Universal Serial Bus) port, an IEEE (Institute of Electrical and Electronic Engineers) 1394 port, a wireless connection, an IR (Infra-red) port, a Bluetooth port, a wired network, a wireless network, a local area network, a wide area network, an ultra-wide area network, an internet, an intranet, and an extranet.

7. (Currently Amended) The system of claim 1, wherein ~~the means for~~ computing the local signature for each chunk associated with the second object on the local device comprises a strong hashing function that is applied to the chunks on the local device.

8. (Currently Amended) The system of claim 1, wherein ~~the means for~~ identifying differences between the first object and the second object on the local device comprises:
~~a means for~~ comparing the remote signature and chunk length list to the local signature and chunk length list;
~~a means for~~ identifying at least one difference between the remote signature and chunk length list and the local signature and chunk length list;
~~a means for~~ mapping the at least one difference to the remote signature and chunk length list; and
~~a means for~~ identifying the at least one updated object chunk from the mapping between the at least one difference and the remote signature and chunk length list.

9. (Currently Amended) The system of claim 1, wherein ~~the means for~~ computing the first fingerprint function at every byte offset of the first object on the remote device comprises:
~~a means for~~ providing a small window that is referenced around each byte position associated with the first object; and
~~a means for~~ generating a fingerprint using the small window at each byte position.

10. (Currently Amended) The system of claim 9, wherein the first processor is further configured for comprising: ~~a means for~~ adjusting a window size associated with the small window based on at least one member of a group comprising: a data type associated with the first object, a data type associated with the second object, an environmental constraint associated with the remote device, and an environmental constraint associated with the local device, the characteristics of the network, a usage model associated with the first object, and a usage model associated with the second object.

11. (Currently Amended) The system of claim 1, wherein the first fingerprint function comprises [[a]] at least one member of a group comprising: a hash function using a Rabin polynomial, a cyclic shifting hash function, a 32-bit Adler hash function.

12. (Currently Amended) The system of claim 1, wherein ~~the means for~~ chunking the first object on the remote device comprises ~~a means for~~ determining at least one chunking parameter.

13. (Currently Amended) The system of claim 12, wherein ~~the means for~~ chunking the first object on the remote device further comprises:

~~a means for~~ determining a chunking horizon from the at least one chunking parameter;
~~a means for~~ computing hash values at each position within the first object;
~~a means for~~ applying a mathematical function to hash values located within the chunking horizon around each position within the first object;
~~a means for~~ designating at least one of cut-points and chunking boundaries when the mathematical function is satisfied; and
~~a means for~~ chunking the first object with the designated cut-points.

14. (Currently Amended) The system of claim 13, wherein the mathematical function comprises at least one member of a group comprising: determining a maximum value within the horizon, determining a minimum value within the horizon, and evaluating differences between hash values within the horizon.

15. (Currently Amended) The system of claim 12, wherein ~~the means for~~ chunking the first object on the remote device comprises:

~~a means for~~ determining a horizon, a trigger value, and a list of other triggers from the at least one chunking parameter;
~~a means for~~ computing hash values at each position within the first object;
~~a means for~~ applying a mathematical function on each computed hash value;
~~a means for~~ designating at least one of cut-point chunking boundaries when the mathematical function attains the trigger value at a given offset and attains the other triggers at all corresponding offsets given by the horizon; and
~~a means for~~ chunking the first object with the designated cut-points.

16. (Currently Amended) The system of claim 13, where the mathematical function comprises at least one member of a group comprising: a predicate that maps hash values into a Boolean value, and another mathematical function that partitions hash values into a suitable small domain.

17. (Currently Amended) The system of claim 12, wherein the second processor is further comprising: a means configured for adjusting the at least one chunking parameter based on at least one member of a group comprising: a data type associated with the first object, a data type associated with the second object, an environmental constraint associated with the remote device, and an environmental constraint associated with the local device, the characteristics of the network, a usage model associated with the first object, and a usage model associated with the second object.

18. (Currently Amended) The system of claim 1, wherein the first processor is further comprising configured for:

a means for receiving the request for transmission of the at least one updated object chunk on the remote device;

a means for extracting the at least one updated object chunk from the second object on the remote device in response to the received request for transmission of the at least one updated object chunk;

a means for sending the at least one updated object chunk over the network with the remote device;

a means for receiving at least one updated object chunk from the network with the local device; and

a means for updating the first object on the local device with the at least one updated object chunk.

19. (Cancelled)

20. (Currently Amended) The system of claim 1, wherein the second processor is further comprising configured for:

~~a means for receiving the at least one updated object chunk from the network with the local device; and~~

~~a means for assembling an updated first object on the local device with the at least one updated object chunk.~~

21. (Currently Amended) The system of claim 20, wherein ~~the means for assembling the updated first object is further arranged such that the updated first object includes at least one unchanged chunk from the first object.~~

22. (Currently Amended) The system of claim 1, wherein the ~~means for negotiating the chunked transmission of the remote signature and chunk length list from the remote device to the local device over the network comprises~~ first processor is further configured for:

~~a means for chunking the remote signature and chunk length list on the remote device to provide a chunked remote signature and chunk length list;~~

~~a means for computing a recursive remote signature for each chunk associated with the chunked remote signature and chunk length list on the remote device;~~

~~a means for generating a recursive remote signature and chunk length list on the remote device with the recursive remote signatures and the chunked remote signature and chunk length list;~~

~~a means for chunking the local signature and chunk length list on the local device, wherein the means for chunking the local signature and chunk length list is matched to the means for chunking the remote signature and chunk length list; and~~

wherein the second processor is further configured for:

~~a means for computing a recursive local signature for each chunk associated with the chunked local signature and chunk length list on the local device, wherein the means for computing the recursive local signature is matched to the means for computing the recursive remote signature;~~

~~a means for~~ generating a recursive local signature and chunk length list on the local device with the recursive local signatures and the chunked local signature and chunk length list, ~~which is associated with the local signature and chunk length list, and wherein the means for~~ generating the recursive local signature and chunk length list is matched to ~~the means for~~ generating the recursive remote signature and chunk length list;

~~a means for~~ negotiating transmission of the recursive remote signature and chunk length list from the remote device to the local device over the network such that bandwidth use is minimized for the transfer of the recursive remote signature and chunk length list to the local device; and

~~a means for~~ identifying differences between the recursive remote signature and chunk length list and the recursive local signature and chunk length list on the local device;

~~a means for~~ requesting transmission of at least one updated signature chunk from the remote device when differences are identified between the recursive remote signature and chunk length list and the recursive local signature and chunk length list by the local device;

~~a means for transmitting the at least one updated signature chunk from the remote device to the local device over the network, wherein the requested at least one updated signature chunk is associated with the remote signature and chunk length list; and~~

~~a means for assembling a copy of the remote signature and chunk length list on the local device with the at least one updated signature chunk.~~

23. (Currently Amended) The system of claim 22, wherein ~~the means for~~ negotiating transmission of the recursive remote signature and chunk length list from the remote device to the local device comprises: sending at least a portion of the recursive remote signature and chunk length list from the remote device to the local device over the network.

24. (Currently Amended) The system of claim 22, wherein ~~the means for~~ chunking the remote signature and chunk length list on the remote device comprises:

~~a means for~~ computing a third fingerprint function at every byte offset of the remote signature and chunk length list on the remote device; and

~~a means for chunking~~ the remote signature and chunk length list on the remote device based on the third fingerprint function to provide the chunked remote signature and chunk length list.

25. (Currently Amended) The system of claim 24, wherein ~~the means for chunking~~ the local signature and chunk length list on the local device comprises:

~~a means for computing~~ a fourth fingerprint function at every byte offset of the local signature and chunk length list on the local device, wherein the fourth fingerprint function is matched to the third fingerprint function; and

~~a means for chunking~~ the local signature and chunk length list on the local device based on the fourth fingerprint function to provide the chunked local signature and chunk length list, wherein the means for chunking the local signature and chunk length list on the local device is matched to the means for chunking the remote signature and chunk length list on the remote device.

26. (Currently Amended) The system of claim 25, wherein ~~the means for computing~~ the third fingerprint function and ~~the means for chunking~~ the remote signature and chunk length list on the remote device employs a different methodology from ~~the means for computing~~ the first fingerprint function and ~~the means for chunking~~ the first object on the remote device.

27. (Currently Amended) The system of claim 24, wherein ~~the means for computing~~ the third fingerprint function and ~~the means for chunking~~ the remote signature and chunk length list on the remote device employs the same methodology as ~~the means for computing~~ the first fingerprint function and ~~the means for chunking~~ the first object on the remote device.

28. (Currently Amended) The system of claim 24, wherein ~~the means for computing~~ the third fingerprint function at every byte offset of the remote signature and chunk length list on the remote device comprises:

~~a means for providing~~ a small window that is referenced around each byte position associated with the remote signature and chunk length list, and

~~a means for~~ generating a fingerprint using the small window at each byte position.

29. (Currently Amended) The system of claim 28, wherein the first processor is further comprising configured for: ~~a means for~~ adjusting a window size associated with the small window based on at least one member of a group comprising: a data type associated with the first object, a data type associated with the second object, an environmental constraint associated with the remote device, and an environmental constraint associated with the local device, the characteristics of the network, a usage model associated with the first object, and a usage model associated with the second object.

30. (Currently Amended) The system of claim 24, wherein the third fingerprint function comprises [[a]] at least one member of a group comprising: a hash function using a Rabin polynomial, a cyclic shifting hash function, a 32-bit Adler hash function, and a 64-bit random hash with cyclic shifting.

31. (Currently Amended) The system of claim 22, wherein ~~the means for~~ chunking the remote signature and chunk length list on the remote device comprises a means for determining at least one recursive chunking parameter.

32. (Currently Amended) The system of claim 31, wherein ~~the means for~~ chunking the remote signature and chunk length list on the remote device further comprises:

~~a means for~~ determining a recursive chunking horizon from the at least one recursive chunking parameter;

~~a means for~~ computing hash values at each position within the remote signature and chunk length list;

~~a means for~~ applying a mathematical function to hash values located within the recursive chunking horizon around each position within the remote signature and chunk length list;

~~a means for~~ designating cut-points in the chunking boundaries when the mathematical function is satisfied; and

~~a means for chunking the remote signature and chunk length list with the designated cut-points.~~

33. (Currently Amended) The system of claim 31, wherein ~~the means for~~ chunking the remote signature and chunk length list on the remote device further comprises:

~~a means for~~ determining a recursive horizon, a recursive trigger value, and a list of other recursive triggers from the at least one recursive chunking parameter;

~~a means for~~ computing hash values at each position within the remote signature and chunk length list;

~~a means for~~ applying a mathematical function on each computed hash value;

~~a means for~~ designating at least one of cut-points and chunking boundaries when the mathematical function attains the recursive trigger value at a given offset and attains the other recursive triggers at all corresponding offsets given by the recursive horizon; and

~~a means for~~ chunking the remote signature and chunk length list with the designated cut-points.

34. (Currently Amended) The system of claim 32, where the mathematical function comprises at least one member of a group comprising: a predicate that maps hash values into Boolean values, and any other mathematical function that partitions hash values into a suitable small domain.

35. (Currently Amended) The system of claim 32, wherein the mathematical function comprises at least one member of a group comprising: determining a maximum value within the horizon, determining a minimum value within the horizon, evaluating differences between hash values within the horizon, summing hash values within the horizon, and calculating a mean of hash values within the horizon.

36. (Currently Amended) The system of claim 33, wherein the first processor is further comprising configured for: ~~a means for~~ adjusting the at least one recursive chunking parameter based on at least one member of a group comprising: a data type associated with the first object,

a data type associated with the second object, an environmental constraint associated with the remote device, and an environmental constraint associated with the local device, the characteristics of the network, a usage model associated with the first object, and a usage model associated with the second object.

37. (Currently Amended) The system of claim 29, wherein ~~the means for~~ computing the recursive remote signature for each signature chunk associated with the chunked remote signature and chunk length list on the remote device further comprises applying a strong hashing function ~~that is applied~~ to the signature chunks on the remote device.

38. (Currently Amended) The system of claim 22, wherein the first processor is further comprising configured for:

~~a means for receiving the request for transmission of the at least one updated signature chunk on the remote device;~~

~~a means for extracting the at least one updated signature chunk from the remote signature and chunk length list on the remote device in response to the received request for transmission of the at least one updated signature chunk;~~

~~a means for sending the at least one updated signature chunk over the network with the remote device;~~

~~a means for receiving at least one updated signature chunk from the network with the local device; and~~

~~a means for assembling a copy of the remote signature and chunk length list on the local device with the at least one updated signature chunk.~~

39. (Currently Amended) The system of claim 38, wherein ~~the means for assembling the local signature and chunk length list is arranged to provide~~ further comprises providing a new copy of the remote signature and chunk length list on the local device, wherein the new copy of the remote signature and chunk length list includes the at least one updated signature chunk.

40. (Currently Amended) The system of claim 22, wherein the second processor is further comprising configured for:

~~a means for~~receiving the at least one updated signature chunk from the network with the local device; and

~~a means for~~assembling a copy of the remote signature and chunk length list on the local device with the at least one updated signature chunk.

41. (Currently Amended) The system of claim 38, wherein ~~the means for assembling the copy of the remote signature and chunk length list is further arranged such that the copy of the~~ remote signature and chunk length list includes at least one unchanged chunk from the local signature and chunk length list.

42. (Currently Amended) The system of claim 22, wherein ~~the means for~~identifying differences between the recursive remote signature and chunk length list and the recursive local signature and chunk length list on the local device further comprises:

~~a means for~~comparing the recursive remote signature and chunk length list to the recursive local signature and chunk length list;

~~a means for~~identifying at least one signature chunk that is associated with a difference between the recursive remote signature and chunk length list and the recursive local signature and chunk length list;

~~a means for~~mapping the at least one signature chunk to the remote signature and chunk length list; and

~~a means for~~identifying the at least one updated signature chunk from the mapping between the at least one signature chunk and the remote signature and chunk length list.

43. (Currently Amended) The system of claim 1 wherein ~~the means for~~negotiating the chunked transmission of the remote signature and chunk length list from the remote device to the local device over the network further comprises:

~~a means for~~determining a number of iterations for recursive processing based on at least one member of a group comprising: a data size associated with the first object, a data size

associated with the second object, an environmental constraint associated with the remote device, ~~and~~ an environmental constraint associated with the local device, the characteristics of the network, a usage model associated with the first object, and a usage model associated with the second object, a number of chunk signatures associated with the first object, and a number of chunk signatures associated with the chunked remote signature and chunk length list.

44. (Currently Amended) The system of claim 43, wherein the first processor and the second processor are further configured for executing comprising:

a recursive procedure for processing a signature and chunk length list, comprising:

~~a means for~~ chunking the signature and chunk length list to provide a chunked signature and chunk length list;

~~a means for~~ computing a recursive signature for each chunk associated with the chunked signature and chunk length list;

~~a means for~~ generating a recursive signature and chunk length list with the recursive signatures and the chunked signature and chunk length list;

~~a means for~~ initializing the signature and chunk length list to the recursive signature and chunk length list when additional iterations are required for recursive processing; and

~~a means for~~ returning the recursive signature and chunk length list when the recursive procedure has completed the number of iterations;

~~a means~~ wherein the first processor is further configured for processing the remote signature and chunk length list with the recursive procedure on the remote device by passing the remote signature and chunk length list to the recursive procedure as the signature and chunk length list, and by returning the recursive remote signature and chunk length list from the recursive procedure; and

~~a means~~ wherein the second processor is further configured for processing the local signature and chunk length list with the recursive procedure on the local device by passing the local signature and chunk length list to the recursive procedure as the signature and chunk length list, and by returning the recursive local signature and chunk length list from the recursive procedure.

45. (Currently Amended) The system of claim 1, wherein ~~the means for generating the~~ remote signature and chunk length list on the remote device ~~is further~~ comprises ~~arranged to~~ compactly encoding ~~encode~~ the remote signature and chunk length list.

46. (Currently Amended) The system of claim 1, wherein ~~the means for generating the~~ local signature and chunk length list on the local device ~~is further~~ comprises ~~arranged to~~ compactly encoding ~~encode~~ the local signature and chunk length list.

47. (Currently Amended) The system of claim 22, wherein ~~the means for generating the~~ recursive remote signature and chunk length list on the remote device ~~is further~~ comprises ~~arranged to~~ compactly encoding ~~encode~~ the recursive remote signature and chunk length list.

48. (Currently Amended) The system of claim 22, wherein ~~the means for generating the~~ recursive local signature and chunk length list on the local device ~~is further~~ comprises ~~arranged to~~ compactly encoding ~~encode~~ the recursive local signature and chunk length list.

49. – 77. (Cancelled)

78. (New) A computer-implemented method for updating an object between a local device and a remote device, each being separate computing devices, the computer-implemented method comprising the local device performing the following steps:

- partitioning a local object into variably sized chunks;
- computing a signature and a chunk length for each variably sized chunk of the local object, wherein each of the signatures and the chunk lengths create a local chunk list;
- generating a local recursive chunk list by recursively chunking the local chunk list into variably sized recursive chunks;
- receiving a remote recursive chunk list, wherein the remote recursive chunk list is associated with a remote object;
- comparing the remote recursive chunk list to the local recursive chunk list to identify differences between the local chunk list and the remote chunk list;

comparing the remote chunk list to the local chunk list to identify any differences between the local object and the remote object;
sending a request for at least one chunk associated with the remote object when the comparison determines a difference;
receiving the at least one chunk after sending the request; and
assembling an object with the at least one chunk after the at least one chunk is received.

79. (New) The computer-implemented method of Claim 78, further comprising sending a request for at least one recursive chunk associated with the remote object.

80. (New) The computer-implemented method of Claim 78, further comprising sending a request for at least one recursive chunk associated with the remote recursive chunk list when the comparison determines a difference, and assembling a signature and chunk length list with the at least one recursive chunk after the at least one recursive chunk is received.

81. (New) The computer-implemented method of Claim 78, wherein generating the local recursive chunk list, further comprises:

partitioning the local chunk list into variably sized recursive chunks;
computing a recursive signature for each variably sized recursive chunk of the local chunk list; and
assembling the local recursive chunk list with the recursive signatures and recursive chunk lengths.

82. (New) The computer-implemented method of Claim 78, wherein partitioning the local object further comprises applying a fingerprint function to the local object to generate fingerprints, and partitioning the local object into the variably sized chunks based on the fingerprints.

83. (New) The computer-implemented method of Claim 82, wherein applying the fingerprinting function further comprises providing a window that surrounds a position in the local object; and computing a value from byte values that are located within the window.

84. (New) The computer-implemented method of Claim 83, further comprising dynamically adjusting the size of the window.

85. (New) The computer-implemented method of Claim 84, wherein dynamically adjusting the size of the window, further comprises adjusting the size of the window based on at least one member of a group comprising: a data type associated with the local object, a data type associated with the remote object, an environmental constraint associated with a local device, an environmental constraint associated with the remote device, the characteristics of a communication medium coupling the local device and the remote device, a usage model associated with the local object, and a usage model associated with the remote object.

86. (New) The computer-implemented method of Claim 83, wherein computing the value comprises computing a hash value from the byte values.

87. (New) The computer-implemented method of claim 81, wherein partitioning the local chunk list into recursive chunks further comprises:

- determining at least one recursive chunking parameter;
- determining at least one of a recursive horizon, a recursive trigger value, and a list of recursive triggers from the at least one recursive chunking parameter;
- computing hash values at each position within the local chunk list;
- applying a mathematical function to hash values located within the chunking horizon around each position within the local chunk list;
- designating at least one of cut-points and chunking boundaries when the mathematical function is satisfied; and
- chunking the local chunk list with the designated cut-points.

88. (New) The computer-implemented method of Claim 87, where the mathematical function is arranged as: a predicate that maps hash values into Boolean values, a first function that partitions hash values into a small domain, a second function that determines a maximum value within the horizon, a third function that determines a minimum value within the horizon, a fourth function that evaluates differences between hash values within the horizon, a fifth function that sums hash values within the horizon, and a sixth function that calculates a mean of hash values within the horizon.

89. (New) The computer-implemented method of Claim 87, further comprising adjusting the at least one recursive chunking parameter based on at least one member of a group comprising: a data type associated with the local object, a data type associated with the remote object, an environmental constraint associated with the local device, an environmental constraint associated with the remote device, the characteristics of a communication medium coupling the local device and the remote device, a usage model associated with the local object, and a usage model associated with the remote object.

90. (New) A tangible computer-readable storage medium having computer-executable instructions for updating an object over a communication channel between a local device and a remote device, each being separate computing devices, wherein the computer-executable instructions when executed by the local device perform a method comprising:

- partitioning a local object into variably sized chunks;
- creating a local chunk list by computing a signature and a chunk length for each variably sized chunk of the local object, including the signature and chunk length for each chunk of the local object within the local chunk list;
- recursively compressing the local chunk list to generate a local recursive chunk list;
- receiving a remote recursive chunk list from the remote device;
- comparing the remote recursive chunk list to the local recursive chunk list to identify any differences between the local chunk list and the remote chunk list;

comparing the remote chunk list associated with the remote object to the local chunk list to identify any differences between the local object and the remote object;

sending a request for at least one chunk associated with the remote object when either the comparison of the remote recursive chunk list or the comparison of the remote chunk list identifies a difference;

receiving the at least one chunk after sending the request; and

assembling an object on the local device with the at least one chunk after the at least one chunk is received.

91. (New) The tangible computer-readable storage medium of Claim 90, further comprising sending a request for at least one recursive chunk associated with the remote recursive chunk list when the comparison determines a difference, and assembling a signature and chunk length list with the at least one recursive chunk after the at least one recursive chunk is received.

92. (New) The tangible computer-readable storage medium of Claim 90, wherein generating the local recursive chunk list, further comprises:

partitioning the local chunk list into variably sized recursive chunks;

computing a recursive signature for each variably sized recursive chunk associated with the chunked local list; and

assembling the local recursive chunk list with the recursive signatures and recursive chunk lengths.

93. (New) The tangible computer-readable storage medium of Claim 90, wherein partitioning the local object further comprises applying a fingerprint function to the local object to generate fingerprints, and partitioning the local object into the variably sized chunks based on the fingerprints.

94. (New) The tangible computer-readable storage medium of Claim 93, wherein applying the fingerprinting function further comprises providing a window that surrounds a position in the local object, and computing a value from byte values that are located within the window.

95. (New) The tangible computer-readable storage medium of Claim 94, further comprising adjusting the size of the window based on at least one member of a group comprising: a data type associated with the local object, a data type associated with the remote object, an environmental constraint associated with a local device, an environmental constraint associated with the remote device, the characteristics of a communication medium coupling the local device and the remote device, a usage model associated with the local object, and a usage model associated with the remote object.

96. (New) The tangible computer-readable storage medium of Claim 94, wherein computing the value comprises computing a hash value from the byte values.

97. (New) The tangible computer-readable storage medium of claim 92, wherein partitioning the local chunk list into recursive chunks further comprises:

- determining at least one recursive chunking parameter;
- determining at least one of a recursive horizon, a recursive trigger value, and a list of recursive triggers from the at least one recursive chunking parameter;
- computing hash values at each position within the local chunk list;
- applying a mathematical function to hash values located within the chunking horizon around each position within the local chunk list;
- designating at least one of cut-points and chunking boundaries when the mathematical function is satisfied; and
- chunking the local chunk list with the designated cut-points.

98. (New) The tangible computer-readable storage medium of Claim 97, where the mathematical function is arranged as: a predicate that maps hash values into Boolean values, a first function that partitions hash values into a small domain, a second function that determines a maximum value within the horizon, a third function that determines a minimum value within the horizon, a fourth function that evaluates differences between hash values within the horizon, a fifth function that sums hash values within the horizon, and a sixth function that calculates a mean of hash values within the horizon.

99. (New) The tangible computer-readable storage medium of Claim 98, further comprising: adjusting the at least one recursive chunking parameter based on at least one member of a group comprising: a data type associated with the local object, a data type associated with the remote object, an environmental constraint associated with the local device, an environmental constraint associated with the remote device, the characteristics of a communication medium coupling the local device and the remote device, a usage model associated with the local object, and a usage model associated with the remote object.

100. (New) A computer-implemented method for updating an object between a local device and a remote device, each being separate computing devices, the computer-implemented method comprising the remote device performing the following steps:

- partitioning a remote object into variably sized chunks;
- computing a signature and a chunk length for each variably sized chunk of the remote object, wherein each of the signatures and the chunk lengths create a remote chunk list;
- generating a remote recursive chunk list by recursively partitioning the remote chunk list into variably sized recursive chunks;
- sending the remote recursive chunk list to the local device with the remote device;
- receiving a request from the local device for a recursive chunk associated with the remote object after sending the remote recursive chunk list to the local device; and
- sending the recursive chunk to the local device after receiving the request.

101. (New) The computer-implemented method of Claim 100, wherein generating the remote recursive chunk list, further comprises:

- partitioning the remote chunk list into variably sized recursive chunks;
- computing a recursive signature and a recursive chunk length for each variably sized recursive chunk of the remote chunk list; and
- assembling the remote recursive chunk list with the recursive signatures and recursive chunk lengths.

102. (New) The computer-implemented method of Claim 100, wherein partitioning the remote object further comprises applying a fingerprint function to the remote object to generate fingerprints, and partitioning the remote object into the variably sized chunks based on the fingerprints.

103. (New) The computer-implemented method of Claim 102, wherein applying the fingerprinting function further comprises providing a window that surrounds a position in the remote object; and computing a value from byte values that are located within the window.

104. (New) The computer-implemented method of Claim 103, further comprising dynamically adjusting the size of the window.

105. (New) The computer-implemented method of Claim 104, wherein dynamically adjusting the size of the window further comprises adjusting the size of the window based on at least one member of a group comprising: a data type associated with the local object, a data type associated with the remote object, an environmental constraint associated with the local device, an environmental constraint associated with the remote device, the characteristics of a communication medium coupling the local device and the remote device, a usage model associated with the local object, and a usage model associated with the remote object.

106. (New) The computer-implemented method of Claim 103, wherein computing the value comprises computing a hash value from the byte values.

107. (New) The computer-implemented method of claim 101, wherein partitioning the remote chunk list into variably sized recursive chunks further comprises:

- determining at least one recursive chunking parameter;
- determining at least one member of the group comprising a recursive horizon, a recursive trigger value, or a list of recursive triggers from the at least one recursive chunking parameter;
- computing hash values at each position within the remote chunk list;
- applying a mathematical function to hash values located within the chunking horizon around each position within the remote chunk list;
- designating at least one of cut-points and chunking boundaries when the mathematical function is satisfied; and
- partitioning the remote chunk list with the designated cut-points.

108. (New) The computer-implemented method of Claim 107, where the mathematical function is arranged as: a predicate that maps hash values into Boolean values, a first function that partitions hash values into a small domain, a second function that determines a maximum value within the horizon, a third function that determines a minimum value within the horizon, a fourth function that evaluates differences between hash values within the horizon, a fifth function that sums hash values within the horizon, and a sixth function that calculates a mean of hash values within the horizon.

109. (New) The computer-implemented method of Claim 107, further comprising:
adjusting the at least one recursive chunking parameter based on at least one member of the group comprising: a data type associated with the local object, a data type associated with the remote object, an environmental constraint associated with the local device, an environmental constraint associated with the remote device, the characteristics of a communication medium

coupling the local device and the remote device, a usage model associated with the local object, and a usage model associated with the remote object.

110. (New) The computer-implemented method of Claim 100, further comprising:
partitioning the local object into variably sized chunks with the local device;
computing a local signature and a local chunk length for each variably sized chunk of the local object with the local device, wherein each of the local signatures and the local chunk lengths create a local chunk list;
generating a local recursive chunk list by recursively chunking the local chunk list into variably sized recursive local chunks with the local device;
receiving the remote recursive chunk list from the remote device with the local device;
comparing the remote recursive chunk list to the local recursive chunk list with the local device to identify any differences between the local chunk list and the remote chunk list;
comparing the remote chunk list associated with the remote object to the local chunk list with the local device to identify any differences between the local object and the remote object;
sending the request from the local device for the recursive chunk associated with the remote object when the comparison determines a difference;
receiving the recursive chunk from the remote device after sending the request; and
updating or synchronizing the local object with the at least one recursive chunk when received from the remote device.

111. (New) A tangible computer-readable storage medium having computer-executable instructions for updating an object over a communication channel between a local device and a remote device, each being separate computing devices, wherein the computer-executable instructions when executed by the remote device perform a method comprising:
partitioning a remote object into variably sized chunks ;
creating a remote chunk list by computing a signature and a chunk length for each variably sized chunk of the remote object and by assembling the computed signatures and chunk lengths in the remote chunk list;

recursively compressing the remote chunk list to generate a remote recursive chunk list with variably sized chunks;

sending the remote recursive chunk list over the communication channel from the remote device to the local device;

receiving a request over the communication channel from the local device to the remote device after sending the remote recursive chunk list, wherein the request identifies a remote chunk for updating, and wherein the remote chunk corresponds to either a first variably sized chunk from partitioning the remote object or a second variably sized chunk from the remote recursive chunk list; and

sending the remote chunk over the communication channel from the remote device to the local device after receiving the request.

112. (New) The computer-readable medium of Claim 111, wherein recursively compressing the remote chunk list, further comprises:

partitioning the remote chunk list into variably sized recursive chunks;

identifying a recursive chunk length for each partition of the variably sized recursive chunks;

computing a recursive signature for each of the variably sized recursive chunk; and

assembling the remote recursive chunk list with the recursive signatures and the recursive chunk lengths.

113. (New) The computer-readable medium of Claim 111, wherein partitioning the remote object further comprises applying a fingerprint function to the remote object to generate fingerprints, and partitioning the remote object into variably sized chunks based on the fingerprints.

114. (New) The computer-readable medium of Claim 113, wherein applying the fingerprinting function further comprises providing a window that surrounds a position in the remote object; and computing a value from byte values that are located within the window.

115. (New) The computer-readable medium of Claim 114, further comprising adjusting the size of the window based on at least one member of a group comprising: a data type associated with the local object, a data type associated with the remote object, an environmental constraint associated with the local device, an environmental constraint associated with the remote device, the characteristics of a communication medium coupling the local device and the remote device, a usage model associated with the local object, and a usage model associated with the remote object.

116. (New) The computer-readable medium of Claim 114, wherein computing the value comprises computing a hash value from the byte values.

117. (New) The computer-readable medium of claim 112, wherein partitioning the remote chunk list into variably sized recursive chunks further comprises:

- identifying at least one recursive chunking parameter;
- adjusting one of a recursive horizon, a recursive trigger value, or a list of recursive triggers from the at least one recursive chunking parameter;
- computing hash values at each position within the remote chunk list;
- applying a mathematical function to hash values located within the recursive horizon around each position within the remote chunk list;
- designating cut-points in the remote chunk list when the mathematical function is satisfied; and
- partitioning the remote chunk list at the designated cut-points to form variably sized recursive chunk.

118. (New) The computer-readable medium of Claim 117, where the mathematical function is arranged as: a predicate that maps hash values into Boolean values, a first function that partitions hash values into a small domain, a second function that determines a maximum value within the horizon, a third function that determines a minimum value within the horizon, a fourth function that evaluates differences between hash values within the horizon, a fifth function

that sums hash values within the horizon, and a sixth function that calculates a mean of hash values within the horizon.

119. (New) The computer-readable medium of Claim 118, further comprising adjusting the at least one recursive chunking parameter based on at least one member of a group comprising: a data type associated with the local object, a data type associated with the remote object, an environmental constraint associated with the local device, an environmental constraint associated with the remote device, the characteristics of a communication medium coupling the local device and the remote device, a usage model associated with the local object, and a usage model associated with the remote object.